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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,802	04/27/2001	Takao Noguchi	206645US0	2819

22850 7590 10/30/2002

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EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1765

11

DATE MAILED: 10/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/842,802	NOGUCHI ET AL.	
	Examiner	Art Unit	
	Matthew J Song	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

P r i d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 1-3 and 6-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsunaga et al (US 6,440,591).

Matsunaga et al discloses a method of ferroelectric thin film coated substrate and device, note entire reference, comprising a silicon (100) substrate 1, a silicon dioxide layer 2, a platinum thin film 4, a $\text{Bi}_4\text{Ti}_3\text{O}_{12}$, bismuth titanate, (001) thin film with a perovskite structure 6 and a ferroelectric thin film 7 (col 1-2 and col 3).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nashimoto (US 5,776,621) in view of Kim (US 6,333,066).

In a method of forming a PZT thin film using a seed layer, Kim teaches the deposition of a good thin film made of only a perovskite seed by thinly depositing a material such as PbTiO_3 as a seed layer and then depositing a PZT thin film thereon (col 1, ln 65-67 and col 2, ln 1-6). Kim also teaches it is difficult to form a high quality PbTiO_3 suitable as a seed layer (col 2, ln 7-45).

Kim does not a silicon substrate with an oxide buffer film.

Nashimoto discloses the epitaxial growth of MgO (100) on a silicon substrate with a (100) orientation and a Pt (100) layer grown on the MgO layer and an epitaxial, i.e. high quality, perovskite PbTiO_3 (001) film grown on the Pt film, where MgO reads on applicant's buffer layer. Nashimoto et al also discloses PZT could also be epitaxially grown on the MgO buffer layer and Pt thin film (col 7, ln 1-32).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kim with Nashimoto to form a high quality PbTiO_3 layer suitable as a seed layer in the formation of PZT.

Referring to claim 2 and 4, the combination of Nashimoto and Kim teaches a PbTiO_3 perovskite oxide thin film.

Referring to claim 3, the combination of Nashimoto and Kim teaches a Pt layer, this reads on applicant's conductive thin film.

Referring to claim 5, the combination of Nashimoto and Kim teaches a ferroelectric film of PZT.

Referring to claim 6, the combination of Nashimoto and Kim teaches the PZT film is used in sensors.

Referring to claim 7, the combination of Nashimoto and Kim teaches a Si (100) substrate with a buffer layer including an oxide thin film, MgO, thereon and a perovskite thin film with a (001) orientation grown on said buffer layer and a ferroelectric thin film grown on the perovskite thin film.

Response to Arguments

5. Applicant's arguments filed 9/17/2002 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Nashimoto's invention with Kim's teaching of a PbTiO₃ layer as a seed for PZT because a to form a PZT thin film, which has good pyroelectricity, piezoelectricity and ferroelectricity and is widely employed for use in sensors, piezoelectric elements and memory devices (col 1, ln 10-15). Furthermore, Nashimoto teaches a method of forming a high quality PbTiO₃ layer and Kim teaches a PZT film formed on a PbTiO₃ seed layer, where it is difficult to

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form a high quality thin film suitable as a seed layer, therefore it would have been obvious to a person of ordinary skill in the art at the time of the invention Kim with Nashimoto to form a high quality PbTiO_3 layer suitable as a seed layer in the formation of PZT.

In regards to applicant's argument that the ferroelectric thin film is formed using a primer layer of perovskite oxide, the multilayer thin film has significantly superior properties and characteristics as compared to a multilayer thin film in the absence of such a primer layer is not persuasive. The instant specification provides no support for the unexpected results in comparison with the closest prior art as suggested by applicant's argument.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


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Matthew J Song
Examiner
Art Unit 1765

MJS
October 28, 2002


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